

DRAINAGE IMPLEMENTATION, MANAGEMENT & MAINTENANCE PLAN

LAND AT FEWCOTT ROAD

FRITWELL

BICESTER

PREPARED FOR:



JOB NO: P18-654

DATE: 3rd July 2023



DOCUMENT HISTORY

Issue No.	Description	Date
1	Issued to discharge planning condition.	07.05.21
2	Updated to include Engineering Layout and pump station operation & maintenance requirements table.	03.07.23

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1. INTRODUCTION

- 1.1 This report has been prepared by Simpson TWS on behalf of CALA Homes (Chiltern) Ltd. to accompany an application for the discharge of Condition 11 of the outline planning application *Ref. 19/00616/OUT* for the proposed development at Land at Fewcott Road, Fritwell. This report provides details of the implementation, management and maintenance requirements of the proposed drainage scheme.
- 1.2 *Part 'f.'* of Condition 11 of the Outline Planning Consent requires the following information to be provided in relation to the operation and maintenance requirements for the drainage proposals for the development:

Condition 11 – As part of any reserved matters for layout and prior to the development commencing detailed designs of the proposed surface water drainage scheme including details of implementation, maintenance and management shall be submitted to and approved in writing by the local planning authority. Those details shall include:

- a. Information about the design storm period and intensity, critical storm duration (1 in 30 & 1 in 100 (+40% allowance for climate change), discharge rates and volumes (both pre and post development), temporary storage facilities, means of access for maintenance, the methods employed to delay and control surface water discharged from the site, and the measures taken to prevent flooding and pollution of the receiving groundwater and/or surface waters;
- b. Any works required off-site to ensure adequate discharge of surface water without causing flooding or pollution (which should include refurbishment of existing culverts and headwalls or removal of unused culverts where relevant);
- c. Flood water exceedance routes, both on and off site;
- d. A timetable for implementation;
- e. Site investigation and test results to confirm infiltrations rates; and
- f. A management and maintenance plan, in perpetuity, for the lifetime of the development which shall include the arrangements for adoption by an appropriate public body or statutory undertaker, management and maintenance by a Residents' Management Company or any other arrangements to secure the operation of the surface water drainage scheme throughout its lifetime.

No building hereby permitted shall be occupied until the sustainable drainage scheme for this site has been completed in accordance with the approved details. The sustainable drainage scheme shall be managed and maintained thereafter in accordance with the agreed management and maintenance plan.

- 1.3 On occupation of the development, this maintenance and management plan should be incorporated into the development's "Operation and Maintenance Manual" with the as-built drainage system operated and maintained in accordance with the requirements set out in the following section of this report to prevent a reduction in the performance of the drainage system over the lifetime of the development.
- 1.4 The maintenance contractor tasked with carrying out any maintenance works should provide a risk assessment and method statement that adopts best practice health and safety policies for maintenance personnel throughout the duration of any maintenance works. Measures may include:

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- Ensure the use of safe systems of work and procedures are followed.
- Certificated operatives only to be used for all confined space entry.
- Ensure appropriate PPE is worn at all times including the use of safety goggles, ear defenders and other relevant equipment when using high pressure jetting.
- Do not work in weather conditions where flooding or surging is likely.
- Erect barriers where appropriate and provide adequate lighting.
- No operations to be carried out by operatives working alone.
- Time maintenance to not conflict with other on-site activities.
- Method statement to be prepared and approved prior to entry into confined space.

2. SITE DETAILS

2.1 The development is proposed at land off Fewcott Road, Fritwell as shown on *Figure 1* below. The site is centred on grid reference SP 52957 29070 and the nearby postcode is OX27 7QP.

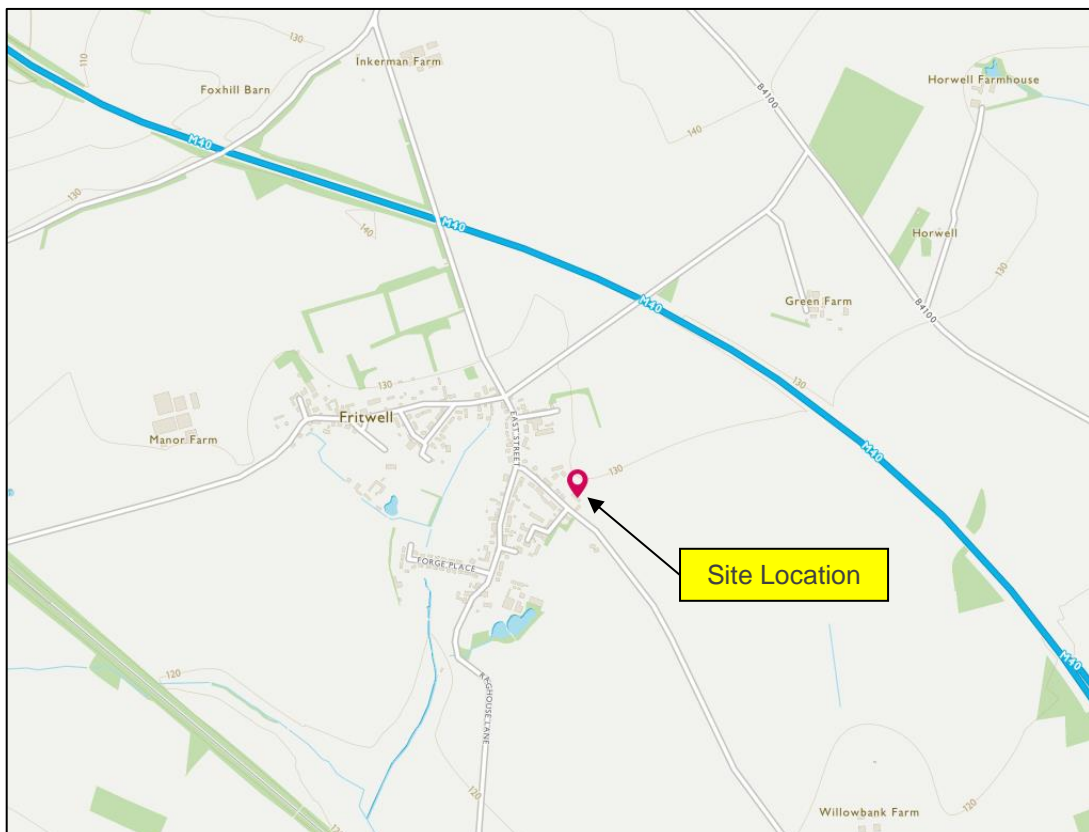


Figure 1: Site Location

2.2 The site is approximately 1.57ha in area and currently comprises of agricultural land.

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3. DRAINAGE IMPLEMENTATION PLAN

3.1 This SUDS Implementation Plan sets out measures to be implemented during construction of the surface water drainage system for the scheme to ensure the site and areas downstream are protected from runoff during construction of the development. It is recommended that the plan is incorporated into the Contractors Construction Health and Safety Plan with the development carried out in accordance with the measures proposed.

3.2 During construction, it is normal practice for a drainage system to be installed at an early stage in the programme. However, it is not always possible to ensure that new impermeable areas created as part of the development are immediately connected to the new drainage system.

3.3 To ensure areas downstream of the development are protected during construction of the development it is recommended that the following management measures are implemented during construction:

- Protective coverings would be used to help prevent runoff stripping material stockpiles.
- Plant and wheel washing would take place in a designated location. The area would be tanked and not allowed to discharge into the drainage system or infiltrate into the ground. Effluent should be treated as contaminated waste and disposed off site by a licensed waste management operator.
- Surfaces used as access roads and storage areas during construction should be swept regularly to prevent accumulation of dust and mud.
- Should groundwater be encountered in excavations such water should not be discharged to the drainage system until the amount of suspended solids has been reduced through the controlled use of skips or tanks, which will act as stilling basins
- To prevent contamination associated with the use of oils and hydrocarbons during construction, the Contractor would ensure that the following precautionary measures are employed during construction:
 - Regular maintenance of machinery and plant.
 - Use of drip trays.
 - Regular checking of machinery and plant for oil leaks.
 - Use of correct storage facilities.
 - Regular checks for signs of wear and tear on tanks.
 - Specific procedures are followed when refuelling.
 - Use of a designated area for refuelling.
 - Emergency spill kit to be located near refuelling area.
 - Regular emptying of bunds.
 - Tanks should be located in secure areas to stop vandalism.

3.4 The above measures would help to ensure that untreated construction runoff would not be discharged to the surface water drainage system.

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- 3.5 The use of porous surfacing will require changes to conventional construction practices and procedures used for traditional car parking and other paved areas, which during the initial stages of the development are often used as access roads and storage areas. Together with runoff from the construction site, which can be heavily laden with silt, such activities are likely to block the porous surfacing system, therefore, the following measures would be implemented to address the issue.
- Installation of the porous surfacing would be carried out at the end of the development programme, when most construction activities are complete, thus minimising the risk of clogging.
 - Should it be necessary to construct areas of porous surfacing at an early stage in the construction programme, an impermeable layer of Dense Bitumen Macadam (DBM) would be laid beneath the surfacing materials to act as a temporary road surface. When most construction activities are complete, holes would be punched through the impermeable layer with final surfacing laid.
- 3.6 During construction, all components of the drainage system should be constructed in accordance with relevant drawings, specifications and manufacturer's guidelines. Further to this Building Control should visit site on a regular basis to inspect completed works and ensure that the drainage system is installed correctly.
- 3.7 Upon completion, all underground pipework would be jet cleaned and CCTV surveyed, areas of porous surfacing would be swept and cleaned and silt / debris present in filter drains would be removed. The Contractor would be responsible for rectifying any significant defects identified at this stage and for a period of approximately 12 months thereafter. At the end of this period a further inspection will be carried out by the Contract Administrator and on completion of any outstanding remedial works, the drainage system would be handed over.

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4. DRAINAGE MANAGEMENT & MAINTENANCE PLAN

- 4.1 This Drainage Management and Maintenance Plan provides details of the plan proposed for maintenance and management of the drainage scheme associated with the proposed development.
- 4.2 On occupation of the development, it is recommended that each element of the as-built drainage system is maintained in accordance with the regime set out in the tables below.

Table 1: Below Ground Drainage System - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Remove all litter and debris from external hard landscaped areas and adjacent landscaping, which may pose a risk to the performance of the system.	Monthly.
	Remove build-up of sediment / silt in catch-pits and dispose of oils / petrol residues using safe standard practices.	As required.
	Stabilise and mow adjacent landscaped areas and remove weeds.	
Remedial actions	Repair or rehabilitate inlet and outlets to ensure they are in good condition and operating as designed.	As required.
	Remediate any landscaping, which has raised to within 50mm of the level of adjacent hard landscaping.	
Monitoring	Check of all inlets / outlets for blockages or evidence of physical damage with any necessary remedial action or clearance carried out if required.	On a monthly basis for the first 3 months of operation, thereafter every 6 months & following severe rainfall events.
	Inspect all surfaces for ponding, or silt accumulation. Record areas where water is ponding for more than 48 hours and carry out any remedial work deemed necessary.	After severe storms.

Table 2: Porous Surfacing - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Remove all litter and debris from drained surfaces areas and adjacent hard / soft landscaping, which may pose a risk to the performance of the system.	Monthly.
	Sweep permeable paved areas. If necessary use jet wash or suction sweeper. Any jointing aggregate lost from the joints must be replaced as necessary with 2/6.3mm single sized aggregate, brushed into joints.	Three times a year at end of winter, mid-summer, after autumn leaf fall, or as required based on site-specific observations of clogging.
	Stabilise and mow adjacent landscaped areas and remove weeds.	As required.
Remediate any landscaping, which has raised to within 50mm of the level of adjacent hard landscaping.		
Carry out remedial work to any depressions, rutting and cracked or broken paving blocks within the permeable paved areas that are considered detrimental to the structural performance or a hazard to users.		
Monitoring	Carry out repair / rehabilitation works to inlets, outlets, overflows and vents.	As required.
	Inspect silt accumulation rates within the permeable paved areas and establish appropriate brushing frequencies.	Annually.
	Check of all inlets, outlets, overflows and vents for blockages or evidence of physical damage with any necessary remedial action or clearance carried out if required.	On a monthly basis for the first 3 months of operation, thereafter every 6 months & following severe rainfall events.
	Inspect and identify any areas that are not operating correctly	On a monthly basis for the first 3 months of operation, thereafter every 6 months & following severe rainfall events.

Table 3: Swale - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Litter and debris removal.	Monthly or as required.
	Grass cutting – to retain grass height within specified design range.	Monthly during growing season or as required.
	Manage other vegetation and remove nuisance plants.	Monthly at start, then as required.
Occasional Maintenance	Check for poor vegetation growth due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where possible.	Annually.
	Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, if required.	Annually, or if bare soil is exposed over 10 % or more of the swale treatment area.
Remedial actions	Repair erosion or other damage by re-turfing or reseeding.	As required.
	Re-level uneven surfaces and reinstate design levels.	
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface.	
	Remove build up of sediment on upstream gravel trench, flow spreader or at top of filter strip.	
	Remove and dispose of oils or petrol residues using safe standard practices.	
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly.
	Inspect infiltration surfaces for ponding, compaction, silt accumulation. Record areas where water is ponding for > 48 hours.	Monthly, or when required.
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.

Table 4: Pumping Station - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Cleaning off the pumps and floats of any debris/ sediment	As required
Remedial Actions	Pump repairs.	As required
	Repair of erosion damage, or damage to tank.	
Monitoring	Checking current resistance to see if there is any indication of motor degradation.	Every 6 months (Unless poor site conditions, therefore every 3 months)
	Checking the impellers to see if they require replacing due to wear.	
	Checking the float switches are set and operating correctly.	
	Inspection of the tank for debris and sediment build up.	
	Inspection of inlets & outlets.	
	Inspection of areas receiving overflow, for evidence of erosion.	

Table 5: Geocellular Storage Tanks - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for first 3 months of operation, then every 6 months.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly.
	Where rainfall infiltrates into blocks from above, check surface of filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary.	Monthly / after severe storms.
	Remove sediment from pre-treatment structures.	Annually, or as required.
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows and vents.	As required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually and after large storms.

Table 6: Flow Control Chambers - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Cleaning off the flow control device of any debris/ sediment.	As required
Remedial Actions	Flow control device repairs.	As required
	Repair of erosion damage, or damage to chamber.	
Monitoring	Inspection of the chamber for debris and sediment build up.	Monthly for first 3 months, thereafter, every 6 months and following severe storm events.

APPENDIX A
PERMEABLE PAVING OPERATION & MAINTENANCE MANUAL



MARSHALLS LANDSCAPE PRODUCTS
TECHNICAL ADVISORY SERVICES DEPARTMENT

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GUIDELINES FOR THE MAINTENANCE OF
MARSHALLS PRIORA CONCRETE BLOCK PAVING

These notes are intended for general guidance and are not intended to be exhaustive.

Marshalls manufacture a range of paving materials in clay, concrete and natural stone which provide a durable, hardwearing surface. All surfacing materials may, during service, experience some degree of surface staining and therefore require regular maintenance and good cleaning practice to maintain the overall appearance of the paving.

MAINTENANCE

To ensure the performance of the Priora permeable paving, Marshalls recommend that there is a maintenance regime undertaken.

The maintenance of the pavement is to ensure the infiltration of the paving is not compromised. The following guidelines are offered as an initial regime, but maybe either increased or decreased depending on paving's local environment and any external contributing factors.

- A visual inspection of the paving should be carried out on a regular basis, ensuring that the joints are kept fully filled. This will confirm the effectiveness of the agitation maintenance due to variations between sites and allow any refinement of the regular agitation activity if necessary.
- The paving should be agitated (e.g. brushed, vacuumed, etc.) at least twice a year. This is to ensure no vegetation of any sort is allowed to grow and develop in the joints. Ideally, this activity should be carried out in the spring and autumn seasons.
- The paving should be inspected after any heavy precipitation to ensure no displacement of any organic matter onto the surface of the pavement.
- For winter maintenance, the controlled use of de-icing products may be used without causing significant detrimental effects towards the permeable pavements performance. When used carefully, the use of these chlorides will not result in an increase in the chloride levels in the local ground.
- Where non-infiltration systems have been employed, the inspection of the outfalls should be undertaken initially on a twice-yearly basis.
- Weed growth – when sedimentation occurs in areas of permeable paving then there is the potential for weed growth, this will typically occur where there are overhanging trees or soft landscaping slopes down on to the paving or in areas which do not receive over run from vehicles particularly frequently.
- Weeds can be removed from the surface through the application of weed killers containing Glyphosate. Glyphosate based weed killers are the most common for general-purpose use, they are most effective on grasses and perennial weeds with non-woody stems. Weeds should be sprayed when they are actively growing so that the Glyphosate will go down to the root and kill the weed completely. Glyphosate will be neutralized upon contact with the ground, which makes it safe to plant in the area soon after treatment. It is available ready mixed or as a concentrate. With the ready mix you will pay a lot for the water that it is diluted with, but if you only have a small plot or if you don't have a safe chemical storage cupboard, then ready mix is the best option.
- Glyphosate based weed killers include: ***Roundup, Tumbleweed and B&Q complete.***

Depending on the amount of usage and the environment the permeable pavement has received and been exposed to, the laying course material may require either cleaning after a 25 to 30 year period. This would be evident if the infiltration rate of

the paving became prolonged, allowing ponding to develop. Should this occur, the uplifting and cleaning (or replacing) of the laying course maybe considered. The laying course material, jointing and Piora blocks may be reused, minimising costs.

Marshalls would advise during the design stage of the project, consideration should be given to the placement and location of underground utilities. This is intended to minimise the need to carry out any excavation work within the main permeable pavement construction

Should a situation arise where access is required, Marshalls would suggest the following approach to the works.

- The initial trench width for excavating should be related to the depth of the sub-base material. For example, consideration to the width of the utility should be considered, plus a degree of working space. The utility undertaker will decide this. In addition to this figure, Marshalls would advise the overall width is determined by the depth of the open graded material plus 20%.
- When removing the first block, a suitable location, such as at the perimeter of the installation or where a unit exists with a larger joint width surrounding it should be considered. Next, as much jointing material should be cleared as possible to reduce the integrity being offered by this material.
- Once a block has become suitably loosened, a block lifter should used to remove it. Due to the interlock offered by the spacer nib profile, it may be necessary to have the block being lifted held in a lifted position, whilst a second person taps the adjacent blocks with a suitable lump hammer or rubber mallet. This may be repeated for the first few units during removal.
- Once the desired area of paving has been removed and carefully staked for reuse, a suitable surfacing material (e.g. membrane, wooden boards, etc.) should be placed on the surrounding paving for the laying course and sub-base materials to be separately stock-piled.
- Once completion of the utility work, the pavement should be reconstructed in accordance with the Marshalls Installation Guide.
- If the pavement construction contains any water-proof membranes or geotextiles, these should be sliced, folded back and weighed down during the opening of the pavement.
- Upon reinstatement, these should be folded back into their original position and be overlaid with a new corresponding material (overlap dimension to be determined between the utility contractor and the membrane/geotextile manufacturer; consideration to bonding/welding the reinstated material should be given depending on site conditions) which has been cut to an appropriate size, before continuing with the next layer of construction.

APPENDIX B
GEOCELLULAR STORAGE TANK OPERATION & MAINTENANCE MANUAL

GEOLIGHT maintenance

Once received stormwater reaches the storage reservoir through one or more distribution pipes laid out on the side faces of the Geolight blocks.

These distribution pipes are covered in a trench filled with draining material requiring little compaction, like washed rolled pebbles, free from fines, and 15/25 grading.

A 10 mm mesh geogrid or GEOTextile, laid between the distribution pipe and Geolight, prevents the horizontal Geolight blocks being clogged by the draining materials.

The permeability of the supply and distribution pipe located on the periphery of the reservoir is designed to prevent any clogging of the system upstream of the stormwater drain.

This sizing is checked for each supply. It is obtained thanks to design programmes by SDS limited following testing of a size 1 reservoir in which all hydraulic configurations were studied.

These tests also made it possible to check the very good vertical and horizontal permeabilities of Geolight blocks and this general layout is usually accepted.

The choice of one of these layouts or a combination of them is according to:

- the place reserved for the reservoir
- available slopes
- hydraulic parameters (discharge)
- position of stormwater input and output systems.

The ends of feeder drains (distribution pipes) are connected to inspection chambers(manholes), acting as settling tanks and making inspection and maintenance of the whole distribution pipe possible. *The silts and sediments contained within the surface water network will remain within the distribution pipe which can be accessed for ongoing maintenance in line with the contract requirements. This means that this sediment cannot enter the crate structure of the attenuation tanks which will not require any maintenance.*

For small discharges, stormwater does not penetrate Geolight blocks, but circulates either in an appropriate bypass, or in the distribution pipe drain. This is for draining the first water which will be handled downstream if required.

When the reservoir is drained, water is drained through a distribution pipe possibly the same as the one located at the input which operates in the opposite direction. Drainage discharge is controlled by the downstream system piping.

A ventilation system consisting of a drainage geocomposite is fresh air vented in the inspection pits. It is laid out in the upper part of the distribution pipes and the general space occupied by the reservoir.

We generally recommend that the stormwater tank inspection chambers are checked periodically in conjunction with general maintenance of the underground pipe network.

APPENDIX C
FLOW CONTROL CHAMBER OPERATION & MAINTENANCE MANUAL

HYDRO-BRAKE® FLOW CONTROL

MAINTENANCE AND SAFETY DATA SHEET

MAINTENANCE

Normally, little maintenance is required as there are no moving parts within the Hydro-Brake® Flow Control. Experience has shown that if blockages occur they do so at the intake, and the cause on such occasions has been due to a lack of attention to engineering detail such as approach velocities being too low, inadequate benching, or the use of units below the minimum recommended size. Hydro-Brake® Flow Controls are fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur. The smaller type conical units, below the minimum recommended size, are also supplied with roding facilities or vortex suppressor pipes as standard.

Following installation of the Hydro-Brake® Flow Control it is vitally important that any extraneous material i.e. Building materials are removed from the unit and the chamber. After the system is made live, and assuming that the chamber design is satisfactory, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. If problems are experienced please do not hesitate to contact the company so that an investigation may be made.

Hydro-Brake® Flow Controls are typically manufactured from grade 304 Stainless Steel which has an estimated life span in excess of the design life of drainage systems.

COSHH

Hydro-Brake® Flow Controls are manufactured from Stainless Steel, which is not regarded as hazardous to health and exhibits no chemical hazard when used under normal circumstances for the stated applications.

MANUAL HANDLING

The handling of Hydro-Brake® Flow Controls should be in accordance with current legislation and regulations:

- The Health and Safety at Work Act 1972.
- The Management of Health and Safety at Work Regulations 1992.
- The Manual Handling Operations Regulations 1992.

All published and printed by the Health and Safety Executive.

**APPENDIX D
ENGINEERING LAYOUT**

